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The Condition of England in 1832 and 1928.

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The Social Factor

III.
The Scientific Factor:
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(*a*) Food.
(*b*) Fresh Air and Sunlight.
(*c*) Exercise and Rest.
(*d*) Cleanliness of the Body.
(*e*) Some Conclusions and Dangers.

V.
The Organization of Health by the Community.

THE FOUNDATIONS OF NATIONAL HEALTH

(*The Sir Charles Hastings Lecture*, 1928)

By

Sir GEORGE NEWMAN,
K.C.B., M.D., F.R.C.P.

(*Chief Medical Officer, Ministry of Health and Board of Education*).

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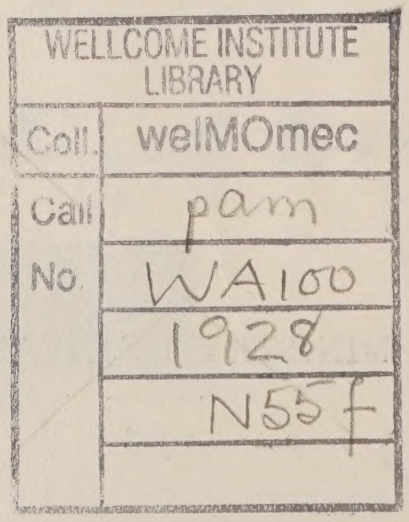
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THE FOUNDATIONS

OF

NATIONAL HEALTH.*

This lectureship commemorates Sir Charles Hastings, the founder of the British Medical Association. He was born in 1794 at Ludlow in Shropshire, the old walled town which was formerly the seat of government in the borderland of the Marches. When 16 years old he was apprenticed to a doctor at Stourport, and graduated in medicine at Edinburgh in 1818, in the illustrious time of Sir Walter Scott and Lord Jeffrey. He settled at Worcester, and in the Board Room of the old Infirmary there he started in 1832 a medical society which was to become the British Medical Association. Quite apart from this particular achievement, Dr. Charles Hastings was one of the small but remarkable group of men who, almost unconsciously, became the pioneers of the national health in the great age of the Reform Bill.

I.

THE CONDITION OF ENGLAND IN 1832 AND 1928.

The condition of England was then very different from that with which we are familiar a century later. Even the outward appearance of the country was different. In 1832 the population of Great Britain, then twenty millions, had for fifty years been steadily collecting in towns; the desertion of the fields was far advanced; the Stockton and Darlington railway train had been running for seven years; the ancient iron industry had been moving from the south to the north to be near the coal; Brindley and Bridgewater

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* The Sir Charles Hastings lecture delivered by Sir George Newman in the Great Hall of the British Medical Association on the 21st March, 1928, the Right Hon. Lord Cozens-Hardy in the chair. (The lecture is reproduced in this form by the courtesy of the Association).

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had made canals, and MacAdam and Telford roads; the towns had been built too rapidly, and the majority of Englishmen dwelt in mean streets, "divorced from Nature but unreclaimed by Art"; and for the mass of people life was drab and dreary, and "drink and religion strove for the souls of men." By 1832 the time of the Great Divide had arrived. Jeremy Bentham had handed on his philosophy and his work to Southwood Smith, Chadwick, and the Mills; the Poor Law Commission had been appointed; Parliament had commenced its famous series of inquiries into the condition of the English people; and the Reform Bill had been passed. From these four sources profound changes were to arise.

To-day we look upon a very different Britain. The population is 43 millions, of whom 27 millions are enfranchised. *Intercommunication* has increased almost beyond belief; there are 20,000 miles of railway and 180,000 miles of road; there has been enormous development of shipping, of postal service, and of newspapers; there is now also the telegraph and telephone, the aeroplane and wireless. These methods of intercommunication, being world-wide, have revolutionized industry and changed the face of our civilization. For improved intercommunication has made actual the enormous potential wealth and capacity of the country. It has enlarged the social life of the people and brought them into the sunlight and fresh air. It has carried them to and from their work. It has furnished their tables with nourishing food, and spread newspapers and books before them, filling their minds with new interests and enabling them to enter a wider citizenship. It has changed both war and peace, and "covered the world with a network of wonderful hours." It is the first great contribution to the saving of life and the postponement of death. Then a compulsory system of *Education* for all classes has been introduced over the length and breadth of the land; an ample and varied food supply comes to us daily from the ends of the earth; the conditions of labour, and the opportunities of leisure, have been immensely improved.

Above all, there has been an *amazing transformation in the health of the people,* for whom life is wider, better, and longer,

and death is more remote. Though the population has more than doubled, the general death rate for England and Wales has been halved since 1838; the child mortality under 5 years of age for London is now about one-third of what it was; the number of deaths under 50 years of age is now 38 per cent.. as compared with 71 per cent. in 1838; and the expectation of life at birth has been extended by as much as twelve years for boys and fourteen years for girls. These remarkable figures mean that the premature death of little children has been enormously reduced, the infectious sickness of adults has been more than halved, the great fatal pestilences of cholera and smallpox have vanished, and human life in England has been prolonged. Here are these wonderful figures in a table:—

	General Death Rate.		Infant Mortality Rate.		Deaths Under 5.		Deaths Under 50.	
	1838–9.	1926.	1838–9.	1926.	1838–9.	1926.	1838–9.	1926.
England and Wales	22·0	11·6	150	70	Per cent. 39·5	Per cent. 15·8	Per cent. 71	Per cent. 38·2
London ..	28·1	11·6	174	64	40·2	14·6	73·6	37·3

In the time of Sir Charles Hastings an age of inquiry into the condition of the people had arrived.

"The great source of the misery of mankind is not their numbers but their imperfections, and the want of control over the conditions in which they live," said Dr. Farr of the General Register Office. "Without embarrassing ourselves with the difficulties which the vast theories of life present, there is a definite task before us—to determine from observation the *sources of health* and the direct *cause of death* in the two sexes at different ages and under different conditions. The exact determination of evils is the first step towards their remedies."*

Farr revealed to the nation that a vast increase of population was going on in a small island which could not itself expand; that a rural people were becoming urban, an agricultural people becoming industrial; that the ravages of pestilence were competing with the evils of social degeneration, and

* *Vital Statistics*, 1885, p. 136.

that both of them must be brought under control; that there is a definite relationship between the price of wheat and the death rate, between poverty and disease, between personal conduct and health.

More important and far-reaching than the actual doings of the time was the new spirit of the nation after the Reform Bill, which showed itself in a wonderful period of constructive statecraft. We have had a century of it. Observe what has happened. Predominant political power has been transferred from an hereditary aristocracy and the middle class to the nation as a whole. Government of the people, by the people, and for the people has *brought to the front the vital and domestic issues of life.* The centre of gravity has moved from the interests of dynasties to the well-being of the people. "Power has only one duty," said Disraeli, "to secure the social welfare of the people." There has been an enormous extension of the conception of the State and of its sphere of operation. We have witnessed the enthronement of the scientific spirit. We have seen the discoveries and inventions of science allied for the first time with industry and commerce, and insurance against risks of every kind has extended and ramified in a truly extraordinary way, becoming even a subtle international agency. Lastly, we have seen an intenser humanity towards children, animals, victims of disease, criminals, and all men and women in need of succour. During the century there has thus been an astonishing growth in human knowledge and contrivance, almost beyond the power of the mind to conceive; a growth and a spirit by which a small nation renewed its youth, spread its influence all over the world, builded an Empire by confederating both alien and kindred races, and at the same time learned for itself more and more of the supreme art of *how to live.* It is indeed one of the most moving stories in the history of mankind.

"The Moving Finger writes; and having writ,
Moves on: nor all thy Piety nor Wit
Shall lure it back to cancel half a line,
Nor all thy Tears wash out a Word of it."*

* *Rubaiyat of Omar Khayyam.*

II.

THE SOCIAL FACTOR.

Let us consider and look around. These great achievements depended on the survival, health and capacity of the body and mind of man. "Inquiry what the event actually was," said Lord Morley, "its significance and interpretation, becomes secondary to inquiry *how it came about.*" How did it come about? Why, in fact, was human life a longer and a healthier thing in the nineteenth century than in the fourteenth? I think the answer is twofold, Social and Scientific, and it is important we should understand it.

First, there was the *social* factor, the vast improvement in the ordinary domestic life of the people. More than two thousand years ago Hippocrates had taught the influence of the external world of air, water, soil, and climate on health and length of human life; but it is only in modern times that we have learned that the genius of agriculture, of engineering, of industry, of trading, and of commerce, all the world over, are intimately concerned with the maintenance or impairment of human health. For it is by these means we get our food, our coal, our clothing, our houses, our lighting, our water supply, and our wages. Nor are these alone. There has been the all-pervading and transmuting effect of social custom and caste; of tradition and religion; of occupation and employment; of eating and drinking; of fashions, of dress and personal appearance; of recreations and amusements (golf, tennis, cricket, football, athletics, swimming and dancing, winter sports); the week-end habit; gardening; country rambles; mountain climbing; enjoyment of the seaside and sea-bathing; travel and change of air; the manifold uses of leisure—all these daily occupations, avocations, and amenities have played a large and primary part in the creation and maintenance of personal and public health. We must give up the idea that health is comprised in sewerage, disinfection, the suppression of nuisances, the

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burial of the dead, notification and registration of disease, fever hospitals, and endless restrictive by-laws and regulations. Health springs from the domestic, social, and personal life of the people. It is, as the Greeks said, the fruit of the more abundant life.

III.

THE SCIENTIFIC FACTOR.

The second great influence in the rise of the national health in the nineteenth century was the extraordinary advance in scientific discovery and the adoption of the scientific spirit. Put down on a piece of paper some of the great political and social events of the last hundred years—the Reform Bill, the abolition of slavery, the factory system, the repeal of the Corn Laws, penny postage, the newspapers, free education, the trades unions and the co-operative movement, the five extensions of the franchise, the reform of criminal law, old age pensions, and the immense cultivation and extension of literature. Then put down by their side some of the landmarks of science—the application of steam to ships and railways, the electric telegraph, the great exhibition of 1851, the Atlantic cable, spectrum analysis, the Suez Canal, the telephone, the internal combustion engine in 1885, Marconi's wireless, the discovery of the North Pole and the South Pole, the aeroplane, Darwin's *Origin of Species*, and the incomparable advance of medical science. Add up the account and see where the balance lies. The story of the relation of these scientific advances to the health and happiness of man would read like a fairy tale, but it would have the advantage of being true. Let me remind you of two examples.

(i) *The Principles of Biology.*

In the *Origin of Species* Mr. Darwin told us of the origin of the *nature* of the human body, and the laws which directly control it—the Law of reproduction and growth, the Law of heredity, the Law of variation (owing to " use or disuse "), the Law of natural selection. There is, he said, no escape from

the operation of these four laws, for they are universal.* They are the principal contributors to the cosmic process as it concerns man, a process of which the human species forms part. It is these laws and this cosmic process which gives man the body in which he lives; and this body is set in the midst of Nature, subject to many external influences. "In every case," said Darwin, "there are two factors—namely, the nature of the organism and the nature of the conditions" under which it lives; but, he added, "the former seems to be much the more important."† A generation later Huxley reminded us that "much may be done to change the nature of man himself" by the control or modification of his internal and external conditions.‡ Indeed, the character of these conditions, what has been called *nurture*, is the factor which is most under our direct control in improving the body of man.

Here, then, we have, according to Darwin, the two fundamental things, the *nature* of man and his *nurture*—the impress on his nature of all the factors and all the influences which affect him, his total environment. The growth of our knowledge of physiology in modern times has immensely expanded our understanding of man's nature, and the potential capacity of the functions of the human body and of its extraordinary powers of defence and repair. Nor must we overlook or set aside social and ethical factors which play a part, and, as civilization grows, an ever-increasing part, in the nurture of man. Human life at its best is, therefore, a balance between nature and nurture, a harmony of all the functions and faculties (whether physical, mental, or moral) moulded and directed by nurture. The body is not merely a machine, what the engineer would call an "assembly of its parts": it is something much more than the sum of its parts—a unified living adaptable organism, with a potential capacity, always susceptible of growth, development, or degeneration.

For in practice we know that there is often *disharmony*, which may be due to inborn defect, or accident, or neglected

* *Origin of Species*, 1859, ch. xv.
† Ibid. ch. i.
‡ *Evolution and Ethics*, 1893, p. 36.

nurture, or disease. What is disease? We have not yet found the full answer to this question. But we have learned that disease is not something arbitrary, capricious, or occult, but due always to definite causes; and we know it is not an external entity or agent—a sort of black dragon outside ourselves which we have to slay or exterminate. There is no external thing which we can call disease. It is something within the living organism. *It is the reaction of the human body to irregularities or agencies in its environment* to which it has not become habituated, and which if prolonged may lead to an actual alteration or degeneration in the tissues of which the body is constructed. It is the disturbance of the harmony of the body which is dis-ease. It is, as Metchnikoff said, a "disharmony"; or again, it has been well described as "the dissociation of the functional unity" of the body. There may be (*a*) inborn flaws or defects in the structure of the body, irregularities in assembling the parts, even inherited taints and blemishes; or (*b*) in the ordinary stresses of life parts of the machinery of the human body may be strained, impaired, or even broken; or (*c*) owing to faults of nurture, habit, or way of life, the functioning of the body and even its structure may have become misdirected or ill-formed; or, lastly, (*d*) the body may be invaded by the agents of infection—parasites. These are examples of the kind of injurious influences and conditions to which the body is liable, and in the presence of which the body itself reacts, producing the signs and symptoms which we call disease.

In short, when we think of the foundations of health, Darwin and his disciples have taught us that we have two main groups of facts to consider—namely, the body of man with its natural powers of reproduction and resistance; and the laws of Nature as the governing factors in its survival. Hygiene or preventive medicine depends, on the other hand, upon (i) the knowledge and practice of the *nurture* of the body, and (ii) the organized prevention or control of the external agencies injurious to it. Thus there is a Science of Life (biology) which includes our knowledge of the Nature of Man and the laws and conditions under which he can live and flourish as a part of the cosmic process; and there is a

practice of Health (Hygiene or Preventive Medicine) which includes our knowledge of the positive nurture of man and the negative prevention of injurious influences acting upon him. We must not expect to apprehend either the science or the practice from hucksters' tips or from the "bits and bobs" of propaganda in an advertisement of a patent medicine. We must learn to look upon the whole business as a *science*, concerned with no less a subject than the Evolution of Man, governed by the immutable laws of the universe, and demanding from us patient learning, vigilant understanding, and strict obedience. For the penalty of the Court for disobedience of the laws of Nature is a degeneration of type or an earlier death sentence.

(ii) *The Advance of Medicine.*

This leads me to the next step we must consider—namely, the outstanding advances of medical science. The eighteenth and nineteenth centuries were exceptionally rich in medical discovery, familiar to us all. John Hunter's living pathology, Jenner's vaccination, the work of Sir Humphry Davy and Sir James Simpson on the abolition of pain by anaesthesia, that of Louis Pasteur and Robert Koch on the causes of infective disease, Lord Lister's triumphant application of that knowledge by the introduction of antiseptic surgery, and the development of the methods of Preventive Medicine—these are six of the epoch-making advances which, with the Darwinian hypothesis, have given us a wholly new outlook upon, and new powers for, the control of disease, the relief of suffering, and the prolongation and betterment of life. They have made brilliant and constructive the period in which we live, beyond any other century. They mark the greatest historic advance of the science and art of Medicine.

Whilst it is unnecessary to describe this progress, it is appropriate to draw attention to two facts in regard to it. First, each of these discoveries originated in previous work on the same subject, and each of them has opened up new fields of knowledge and life-saving applications. For instance, Jenner's work showed not only that vaccinia

could be transferred from the calf to man, and from man to man, but he proved the validity of the proposition that vaccinia in man diminished the liability to attack by small-pox. In so doing he introduced an artificial method of producing *immunity*, which has since been applied for the prevention or cure of many other diseases. He opened a door which is always opening wider; he proved a secret of Nature's ways to be true. Sir Almroth Wright's dictum that "the physician of the future will be an immunizator" is a logical deduction from the ever-growing practical experience of medicine. Further, the study of immunity has shown that in many infective diseases substances appear in the blood which are antagonistic either to the invading micro-organism or its toxins, suggesting both that a process of immunization is going on in the body during the attack, and that it is due to antibodies developed by the reaction of the tissues to the invading infective agent. In other words, the study of natural immunity has revealed the fact that *the healthy body itself fosters defensive properties* and resistant potentialities. These are four in number.

(i) The resistant power arising from the physiological reserve of health, the adequate nutrition of the body, the power of hypertrophy, and of increased functioning and metabolism in emergency.

(ii) There is the control by the "vasomotor" nerve system, which regulates the blood supply of any given part of the body, flushing it on demand with the refreshing current of the blood stream.

(iii) There is a defence established by means of cells in the blood, lymph, and tissues, which have the remarkable power of first catching, and then absorbing into their own substance, any invading germ or foreign element with which they come into contact.

(iv) There are the newly discovered biochemical powers represented partly by the normal secretions of the ductless glands (*hormones*), and partly by the

group of *antitoxins* which follow in the wake of toxins and are the direct reaction of the healthy body to their presence.

These four separate lines of defence are powerful, but it must be remembered that they never act in isolation. They are mutually interrelated, they co-operate together under a unified command, and they depend for their very existence upon a healthy and well-nourished state of the body. When, therefore, an infecting bacillus attacks man, it sets up, automatically, a chain of natural defences—(*a*) increased functional activity; (*b*) a fuller blood supply; (*c*) the stimulation of the catching and absorbing cells (*phagocytes*) and the excitor secretions (*hormones*); and (*d*) a new formation of cells and substances antagonistic to, or assimilative of, the toxic products of the bacillus. When we ponder upon this array of defences called into operation by the act of infection we cannot be surprised that one attack of a disease is not followed by another, and that a natural immunity against certain diseases may be established. We begin to see the true philosophy of the action of antitoxins and vaccines; we understand a little better the survival of man's body in Nature; and we learn once and for all the necessity of bodily health as the strong and primary foundation of Preventive Medicine. Aristotle defined health as the power of resistance to injurious influences.

Secondly, each of these six momentous medical advances has not only won triumphs in its own sphere of the medical or surgical treatment of disease, but it has indirectly furnished new methods and confirmations in regard to the foundations of health itself. Their principles have been, in fact, applicable to the creation and maintenance of health as well as to the treatment of disease. Pasteur not only elucidated the cause of fermentation and particular infections, but his work changed the whole attitude of men's minds to the relation of cause and effect in all forms of infection and bodily condition. "What hopes seized upon me," he said, "when I realized that there must be *laws* behind so many obscure phenomena." Lord Lister not only taught the antiseptic principle and method of dealing with surgical wounds or compound fractures

but the supreme importance of similarly attacking all forms of septic poisoning—in fact, to the necessity of cleanliness and asepsis to a healthy body.

IV.

THE NURTURE OF THE BODY.

The fundamental problem of health, then, is the wise and scientific *nurture* of the body. Now, can we say in plain and categorical terms in what such nurture consists? Here is your body with its nature, its heredity, its variation, its inborn instincts, impulses, and organic functions, the instrument of emotion, intellect, and will—a living organism of long biological ancestry, the whole man—can we define the best nurture for it? I think we can, but only in general terms. Perhaps indeed one term, *nutrition,* is the answer. It is when we attempt to be prescriptive and dogmatic in detail that we go astray, for each human body is, as Galen pointed out, individual in its "preparation" for health or disease. Yet some general rules of nurture man has learned through thousands of years of experience. The trouble is that he will not *practise* them.

The elements of nutrition for the body are six in number:

Food,	Warmth,
Fresh air and sunlight,	Cleanliness,
Exercise of the body,	Rest.

If these necessities be provided we may have some "approximation," as Emerson called it, to full physical life; but if they are withheld or inadequate we shall assuredly have insufficiency, poor physique, disease, and even premature death. Though this knowledge is as old as the history of the human family, it is still only partially applied to the building of men or the rearing of a race. For though the general proposition is simple, its application is complex and variable. What is the ideal form of nutrition in any given climate or for any given age of life, and how can we follow it? How can we live in the open air if we also live in houses and in cities?

By what means can we secure sufficient exercise, and of what nature should it be? And how can we escape the condemnation by Galen of the over-specialization of Greek physical culture? The answer to these questions comes only by *education and experience.* For, given a "living wage," and given a sufficient yield of the proper food necessary to man's health —and, speaking generally, these desiderata are available in this country—there can be but one answer: People do not live the healthy life *because they lack knowledge.* As the Duke of Devonshire said in 1904, "the people perish for lack of knowledge." It is ultimately a matter of the instinct, education, and experience of the individual.

(*a*) *Food.*

Let us consider for a moment the most important of these six—Food. The products of digestion enter the blood from the alimentary canal, and thus all parts of the body are nourished. It is of vital importance to eat the food which will build, repair, warm, and energize the body. Ignorance of a sensible dietary is the direct cause of much preventable disease, and more people suffer from eating too much than too little. It is common knowledge that man's diet should be mixed and varied; should be sound in quality and sufficient in quantity; consumed at regular intervals; and appetizing and digestible. It should contain:

Some *proteins,* such as occur in meat, fish, milk, bread, cheese, eggs, peas, beans, lentils;

Some *fats,* as in cream, butter, suet, lard, dripping, olive oil, etc.;

Some *carbohydrate,* as in sugar, bread, potatoes, rice and starchy foods;

Mineral salts (calcium, iodine, magnesium, sodium, and potassium), in milk, cheese, eggs, green vegetables, and fruit, the last two furnishing a considerable bulk of fibrous material valuable in stimulating alimentary movement. Lastly, there are certain substances essential for growth and nutrition known as *vitamins,* present in extremely minute quantity in various foods.

Several principal kinds of vitamins are recognized, and are called vitamins A, B, C, D, etc. Vitamin A, found especially in milk, butter, cheese, yolk of eggs, and green vegetables, is necessary for growth. The primary method of defence against infective disease is attained and retained by an adequate diet, and experimental evidence indicates that vitamin A is specifically concerned in this defence. Vitamin B, found mainly in cereals, pulses, and yeast, is also necessary for growth and for the maintenance of nervous stability. Vitamin C, found in various fruits and leaves, but especially in lettuce, cabbage, and oranges, is effective in the prevention of scurvy. Vitamin D occurs richly in cod-liver oil, oily fishes (such as herrings), and egg-yolk ; it is concerned in the proper development of bone and teeth. A deficiency of this vitamin leads to defective calcification of bones and teeth ; as regards bones, this defect in calcification may lead to rickets, osteomalacia or other degenerative conditions of the bone, according to the age of the individual and other conditions. As regards the teeth, increased susceptibility to caries will result.

Goitre may follow insufficiency of intake of iodine, as stunted growth may result from poorness of proteins or excessive or unbalanced cereals (which should always be associated with milk, eggs, and green vegetables). It should be remembered that the vitamins exercise both joint and interdependent action and may be destroyed by over-cooking. A plentiful supply of sunlight to the skin will make up for certain deficiencies. In addition to these various requirements of living protoplasm we must add *water*. The transmission of nutritive substances to all parts of the body is done by " water transport." So, too, excretion of waste.

But merely to devise ideal dietaries is not enough. If a chemically ideal and model food be prepared in the laboratory with the proper amounts of each essential constituent, and then it be sterilized, dried, or otherwise " preserved," it will be deprived of some of its vital and natural principles. Hence, dried foodstuffs, preserved vegetables, proprietary foods, overcooked foods, and tinned meats, though possessing practical advantages, are reduced in value as foods. Such

foods become auxiliary only, for they are deprived in some measure of their vital and natural taste, disposition, and variety of composition. They require supplementing with other foods. Appetite and liking have much to do with choice of food. "We may take fancy for a companion," said Johnson, "but must follow reason as our guide." Moreover, nutrition does not consist only of pabulum, the food. There must be healthy activity of those physiological processes which have to do with mastication and preparation, with absorption and assimilation, metabolism and excretion. Healthy and complete nutrition is infinitely more comprehensive than mere feeding, mere filling of the stomach. It connotes a healthy body in all respects, a brain and nervous system in tone, a healthy muscular and digestive system, free circulation of blood and lymph. Now, when we turn to the dietetic conditions of the great mass of the workers we find a tale of beer and bread, of tea and pickles, of tinned meat and proprietary foods, or a weary round of bacon and herring and cheese—and of an unstable digestive system and an impaired physique. But variety, mixture, appetizing cookery, freshly prepared or natural food, the healthy conditions of sound digestion—these are the essential things so often ignored. This is partly due to our medical neglect of rational physiological feeding, which is worth more than all the drugs in the market; partly to the vicious custom of the sedentary worker to combine an excessive consumption of unsuitable food with an entire lack of daily exercise; partly to ignorance and bad habit.

Finally, there are some food rules which it is expedient to adopt.

(*a*) Strict and persistent moderation in diet tends to longevity, and excess tends to early mortality.

(*b*) Nature has provided that food should be masticated, and should reach the stomach slowly and not too frequently.

(*c*) The number of meals taken daily is a matter of individual practice and custom; no food should be

taken between such regular meals, as eating promiscuously gives the body no rest.

(*d*) Whatever be your ordinary dietary, see that it includes a sufficiency of such foods as milk and eggs in some form, fresh vegetables and an uncooked green salad, all of which contain vital principles.

(*e*) Eat less after forty years of age.

(*f*) A small quantity of beverage with the meal is desirable, but there should be no excess of alcohol—alcohol is not in ordinary circumstances necessary to health ; there should be, as a rule, no alcohol before meals or between meals, and none for children.

(*g*) There should be no active exercise immediately after a meal. "Unquiet meals," said Shakespeare, "make ill digestions."

(*b*) *Fresh Air and Sunlight.*

I have not time to discuss at the same length the other essentials of true nurture ; but each of them is important. Fresh air is almost as valuable to health as food. It is, indeed, another element in nutrition, for the living processes carried on in every cell of the body require oxygen. This reaches the body through the nose, passes to the lungs, enters the blood stream, and is thus carried, like the products of digestion, to all parts. Breathing should always be through the nose, in order that the air may be properly filtered and warmed before reaching the lungs. The fresh incoming air conveys oxygen and expels the used-up air of the lungs. Its physical properties of coolness and movement are valuable as conducive to the increase of metabolism and stimulation of the skin and the appetite. There can be no more far-reaching or beneficial method of improving the health of the people as a whole than the wider practice of the open-air life. As Walt Whitman said in the *Song of the Open Road* :

> "Now I see the secret of the making of the best persons.
> It is to grow in the open air."

Every school should be an open-air school and every home an open-air home. It is the stagnant overheated air, loaded with moisture and organic impurity, which is harmful in factories, offices, homes (especially bedrooms), or schools. The means of avoiding it is effective ventilation which shall give us fresh, clean, cool, moving air, without draught. Therefore ventilation should be "cross" or "through," which means that inlet and outlet must be opposite to each other. The temperature of the room should be about 60° F.

One of the principal advantages of the open-air life is that it affords more opportunity of gaining benefit from direct sunlight. All the rays of the sun are advantageous, but the invisible ray beyond the violet (ultra-violet) is believed to exert special health-giving benefit. This beneficent action is due to the "manufacture" of vitamin D in the skin by the action of the rays on an inactive constituent (ergosterol). Unfortunately the ultra-violet ray is filtered out by ordinary window glass; hence its health-giving property is more obtainable in the open air. It is now used widely in its natural form in the treatment of debility, rickets, tuberculosis of the skin, bones and joints (*heliotherapy*), and artificially for some of these conditions by means of the arc lamp. Atmospheric smoke and the indoor life of English towns are without doubt depriving large portions of the population from enjoying the health obtainable by sunlight and fresh air.

(*c*) *Exercise and Rest.*

The daily *exercise* of the body is another primary need. Various forms of exercise tend to strengthen all the muscles (including the heart), deepen and increase the rate of respiration, produce body heat, induce the skin to perspire, secure and maintain equilibrium, and develop the motor and sensory centres of the brain. They are essential if proper benefit is to be derived from food, if the digestive organs and the alimentary canal are to be kept in good working order, if proper secretion through the kidneys, skin, and lungs is to be ensured, and if the nervous regulation of the body is to develop. George Meredith, the novelist, used to say that

every man "should get into a sweat at least once a day." It is not a bad rule. Motoring has advantages, but we must beware of becoming "all liver and no legs." To walk to the station is better than to take a bus. It should be remembered that ordinary active forms of free exercise are wisely supplemented by more regular and systematized forms of exercise, including games, swimming, and dancing, which play a part in the harmonious training of the body as a whole, which lead to improvement in the general physique, the correction of faulty attitudes, and the acquirement of habits of self-discipline, control, and ready response. Montaigne and Mulcaster believed in the educational value of free, playful and sportive games. But we must not overdo physical exercise, or allow any system to become a thraldom or fetish —or be specially violent in exercise on Saturdays and negligent of it for the remainder of the week.

It is important that we should recognize that physical exercise is something vastly more than "drill and jerks." It is one of the ways in which the Law of Variation fulfils itself, the means by which we "exercise" and use rightly all the organic functions of the body—respiration, circulation, digestion, excretion, reproduction—the method by which we train the organs of special sense, and educate the nervous regulation of the body. "Use or disuse," in relation to immediate environment, lies at the basis of variation in individuals as in species.

Speaking generally, it may be said that most people stand in greater need of *rest* than of movement. "The first and second secrets of Nature," said Emerson, "are Motion and Rest." Our American cousins and ourselves are getting much too restless for good health, or even mental capacity and balance. For repose is the "foster nurse of nature." There is an excess of noise, clatter, chattering, and meaningless activities which have no value or virtue in themselves, and for children are directly harmful. Indeed, children require time, peacefulness, and rest in order to grow and ripen, and there is wisdom in Madame Montessori's excellent injunction "Silentio" on the walls of her House of Children at Rome.

Children under 15 need ten to twelve hours in bed every night. Shakespeare fully recognised the healing value of—

> " Sleep that knits up the ravell'd sleave of care,
> The death of each day's life, sore labour's bath,
> Balm of hurt minds, great nature's second course,
> Chief nourisher in life's feast."*

For children also it is particularly important to secure and maintain a nice balance between the production and loss of body heat. The newborn infant is unable to effect this accommodation, and its power of heat regulation is undeveloped. The very young and the old are particularly susceptible to external conditions of atmosphere and temperature, and we have yet much to learn in the practice of *warmth* and its relation to hygiene. The majority of people have not yet learned how to protect against, and adapt themselves to, the varieties of climate and atmospheric conditions of the temperate zone in our North Atlantic island.

(*d*) *Cleanliness of Body.*

Lastly, there is cleanliness—within as well as without. In the Middle Ages people did not wash, they went dirty, and this disregard of cleanliness must be associated with their neglect of other items of our model six, which was perhaps one of the chief causes for their very unhealthy and shortened lives. The skin of the body cannot perform its most important functions unless it be clean ; but the teeth, lungs, stomach, alimentary canal, and blood must also be kept clean, if we are to be unconscious (as we ought to be) of their existence. A clogged machine does not work well.

(*e*) *Some Conclusions and Dangers.*

Before leaving these maxims of body nurture there are three things I have to say about them which are not of less importance because they can be said shortly. The first is this : *All* these six principles of nutrition must be followed if we would obtain true nurture of the body. It is idle, and

* *Macbeth II, ii,* 38.

indeed harmful, to advocate any one or other of them at the expense of the remainder. The loss of any one of them will impair man's health and eventually imperil his life. The neglect of them is the occasion of disease. Yet, as Thucydides, the Greek historian, said, "So little pains will most men take in search for truth, so much more readily will they turn to what comes first." Secondly, each of these principles must be followed in moderation and not to the extreme. The Greeks were wise in their admonition: "Know thyself; and be moderate." In fact, the pathway to health of body and mind is life-long education, that the mind may rule the body and the body be, as Cicero said, "fit to obey the prescriptions of the mind."* Thirdly, the practice of each of them must accord with the total normal functioning of the body, the end and object of which is health. The body has many powers of protection, defence, and repair, but the laws of Nature are exacting and even severe on any assault upon, misuse, or abuse of, vital functions. In other words, the body will stand considerable strain along the line of its own powers, but no disharmony with impunity.‡

In these days of public education in health it is necessary to avoid two subtle dangers. On the one hand we must beware of "stunts" and "panaceas"; Nature is too varied and the world too wide for ultimate truth to lie along that road. On the other hand, perverse or ignorant unwillingness to accept the established findings of science is likely to deprive us of valuable aids in the struggle for life and the survival of the best. He is a wise man who finds out the faculties and powers of his own body and nurtures them rather than misdirecting or neglecting them. The spirit we need to cultivate should spring from an effective and reasonable co-operation between the dictates of humanity, the rights of the individual, and the established truths of science. It was Laertius the Stoic who said, long ago: "The end is to act in conformity with Nature, with the Nature that is within us and with the Nature of the universe."

* *The Offices*, xxiii.

‡ See also *Handbook of Suggestions on Health Education*, issued by the Board of Education (published by H.M. Stationery Office).

V.

THE ORGANIZATION OF HEALTH BY THE COMMUNITY.

Finally, we must ask ourselves the question, How can these essential conditions of nurture be organized? The position is this. We have first to deal with the nature of man's body and its individual nurture in order to secure a resistant, effective, and reproductive body; then in a civilized State, we have to provide the opportunity for all men to ensure for themselves and their families this nurture. Some can do much without communal aid, the majority cannot; in any event, no man can live unto himself. Whether we like it or not, we are members one of another. As in nature, so in society, solidarity and interdependence are inherent. Hence, *in a civilized State it is the nature and nurture of the individual and the communal organization of opportunity which are the Foundations of National Health.* The organization of health, which is the organization of life, is the primary, though not the supreme, business of Government, of statecraft, whether central or local.

Now the purpose of Preventive Medicine may be expressed in simple words. It is to improve the total environment of man's body, to develop and maintain his innate capacities, to avoid or reduce disharmony and disease in its early stages (in order to escape or postpone its later and mortal results in the body), to prolong and enlarge man's days, and to extend the frontiers of life. Sir Thomas More told us that in *Utopia* health was "esteemed as the greatest of all pleasures, the foundation and basis of all other joys of life."

The community will adopt diverse means for the fulfilment of such a policy: some methods will be voluntary or professional, others will be undertaken by official administration, central or local. "Power," said John Stuart Mill, "may be localized, but knowledge, to be most useful, must be centralized." What are the main lines of this policy?

(1) First, there must be created and maintained a *Sanitary Environment,* the external scaffolding of health:

housing, water supply, drainage and refuse removal, sanitary workplaces, sound roads, clean streets, and well-ordered towns.

(2) Secondly, there must be *Systematic Nurture*, beginning before birth—the protection of motherhood, infant welfare, child hygiene, the care of the adolescent, a practical, comprehensive, and liberal education, and a wholesome food supply.

(3) Thirdly, there must be a *Preventive Organization*, by which the agencies of infection and disease are brought under control—the segregation of infectious persons, disinfection, quarantine, supervision of the channels and materials of infection, the reduction of mass infection, the production of immunity, the provisions of antitoxins, the special and direct attack upon all forms of epidemic disease.

(4) Lastly, there must be public and private *Medical Services* (of which the medical man is, and always must be, the exponent and practitioner) in order that correct diagnosis and sound treatment may be available for the whole community—general medical practice, clinics, dispensaries, sanatoria, hospitals, factory medical service, a health insurance system, and medical provision for the poorest. Western civilization relies upon insurance as the most effective means of placing the people in a position to obtain and use the resources of the science and art of medicine.*

There you have the great Articles of the modern practice of Preventive Medicine, to be discharged by the local government bodies in every area of the country. They all belong to each other, and no local authority can afford to neglect any one of these four Articles. They constitute the elements of the modern programme of Preventive Medicine, a programme introduced voluntarily by the medical practitioners

* See also *An Outline of the Practice of Preventive Medicine*, issued by the Ministry of Health (published by H.M. Stationery Office).

of the eighteenth century. Some of the items of this programme have in the past been fulfilled best by the agency of pioneer voluntary health societies, particularly those items which are of a personal character and dependent upon a well informed public opinion. Such voluntary work should be comprehensive in scope and have regard to the importance of co-operation with the local authority. Sanitary and medical experts have their place; but health is Everyman's duty. It must be every man's Quest ere it can become a national Conquest. The essential thing is the healthy and resistant body of man, and the maintenance of his harmonious functioning, in relation to Nature and his environment, and in relation to human society. Progress depends more upon personal, social, and moral evolution than the advance of sanitary science—more upon wisdom than knowledge. The vastly improved health of the people in our generation has no doubt been partly due to the fuller application of medical science and sanitation, but still more to the forces of *education*, *sociology*, and *biology*.

If we reflect upon these considerations we shall discover that the preservation of human life, the enlargement of its capacity, and the increase of its productivity, is not a mere doctor's "stunt," but springs from deep human instincts and is established upon broad social and economic conditions. It is, in fact, social and medical in structure, though economic and moral in inspiration. It is, I submit, the primary need, as it is the chief asset, of a nation.

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